

APRIL 2024

# Report on Capacity Building Program

13 MARCH - 6 APRIL 2024

SSBT's COLLEGE OF ENGINEERING & TECHNOLOGY  
BAMBHORI, JALGAON - 425001, MS, INDIA  
Included under Section 2(f) & 12(B) of the UGC Act 1956



[sscoetjal@gmail.com](mailto:sscoetjal@gmail.com)



[sscoetjalgaon.ac.in](http://sscoetjalgaon.ac.in)



+91 - 257 - 2258393

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# About the Program

Realizing the importance of preparing professionals in cutting - edge areas, the SSBT's College of Engineering & Technology, Bambhori, Jalgaon has initiated steps for continuous professional development of faculty members to meet the need of hour. As part of initiation, the institute organized capacity building program for faculty members from 23 March to 6 April 2024. In the program, the senior faculty members were the resource persons and all faculty members attended the program with full enthusiasm thereby creating the environment of peer - learning.

## Objectives



The objectives of the program are as follows:

1. Empowering faculty members with cutting - edge technologies
2. Developing a culture of shared learning among faculty members
3. Inculcating creativity, critical thinking, communication, and cooperation among faculty members

## Outcomes



The outcomes of the program are as follows:

1. Enriching curriculum with cutting - edge technologies
2. Motivating students for creativity, critical thinking, communication, and cooperation
3. Engaging students to apply engineering knowledge in societal, environmental & sustainable issues
4. Engaging in independent and life-long learning

In the program, 80 faculty members from all departments attended the sessions.

# Vision India 2047

## Date: 23 March 2024



Dr. Mujahid Husain  
Professor in Civil Engineering

India in 2047 holds a vision that transcends boundaries, a tapestry woven with threads of innovation, inclusivity, and progress. Envisioning India in 2047 is to imagine a nation where diversity is celebrated as a cornerstone of strength, where every citizen has equal opportunities to thrive regardless of their background. Technological advancements have reshaped the landscape, with smart cities seamlessly integrated into the fabric of society, fostering sustainable living and connectivity. Education has evolved into a dynamic system that nurtures creativity and critical thinking, empowering the youth to drive transformative change. In this vision, healthcare is not just a service but a fundamental right, accessible to all, supported by breakthroughs in medical research and infrastructure. Environmental sustainability is at the forefront, with India leading the charge in renewable energy and conservation efforts, ensuring a greener future for generations to come. Economic prosperity is not measured solely by GDP but by the equitable distribution of wealth and opportunities, lifting millions out of poverty and fostering a vibrant entrepreneurial ecosystem. Above all, the vision for India in 2047 is one of unity, where differences are bridged through dialogue and empathy, where the collective dreams of a billion souls propel the nation towards a brighter tomorrow. It's a vision fueled by optimism, resilience, and the unwavering belief in the limitless potential of the Indian people.

# Innovative and Sustainable Technique of COD Removal

Date: 23 March 2024



Dr. Farooq Chavan  
Assistant Professor in Civil Engineering

Fresh water is the scarce most entity in twenty-first century (Koffie Annan). Polluting fresh water makes it still scarce. Domestic wastewater is the prime source of water pollution. The government has a compressive plan to establish sewage treatment plan for all major cities all over the country. The conventional sewage treatment technologies, particularly biological methods are highly sensitive and expensive. Adsorption of wastewaters is emerging up as inexpensive, reliable, robust and efficient alternative. Its application for domestic sewage is a green area for research. Traditionally the adsorption is done using activated carbon. They are very expensive. Yet the low cost sorbents are also emerging up now a days. These sorbents are prepared from low cost agricultural wastes to reduce the COD. The present work used Four agriculture based sorbents: Jamun leaves, Neem leaves and green coconut husk and Maize. COD means it is amunt of oxygen required to oxidised the organic matter present in waste water. Organic matter are amino acids, fatty acid, hydroxyacids, steroids. Source of COD ie the rise in COD level of the waste water is a result of accumulation of solid waste, soluble organic compund residual food waste and the emulsified oils and the dying bacteria. In this study blends are prepared from Jamum leaves, Neem leaves, maize and Coconut husk, blends are found to be better adsorbents than the Parents adsorbent because the percentage removal of efficiency is 100 %.

# Machining of Metal Matrix Composite

Date: 23 March 2024



Dr. Ajay R. Bhardwaj

Assistant Professor in Mechanical Engineering

Machining of metal matrix composite materials is not easy as compare to conventional material. As reinforcement in the composite is highly abrasive and hard in nature due to which there is rapid tool wear and poor surface finish. The objective of machining to maximize metal removal rates, while maintaining the surface finish quality, and dimensional accuracy of the machined materials. Almost every potential MMC component is machined to some degree - even if only for fastener holes. During machining of MMCs the reinforced particles are fractured and pulled out of the matrix due to which surface quality deteriorates, rapid tool wear and increased machining cost. In machining MMCs, tool selection is of primary importance. Machining characteristics depends on the reinforcement material, type of reinforcement (particle or whisker), distribution of reinforcement in the matrix, and volume fraction of the reinforcement and matrix. Among the different tool materials, polycrystalline diamond (PCD) tool, chemical vapour depositions (CVDs), cubic boron nitride (CBN), tungsten carbide (WC) are mostly used for machining of composites. A high percentage of the cost involved in producing a finished component for a high performance application results from machining. Therefore, in order to reduce the final cost of components produced from MMC, it is important that their machining behaviour should be fully understood.

# The Impact of Total Quality Management Practices on Organizational Performance: A Comparative Study across Industries

Date: 23 March 2024



Dr. Mahesh Rawlani

Associate Professor in Business Administration

**Introduction:** Total Quality Management (TQM) has emerged as a critical strategy for enhancing productivity, efficiency, and competitiveness in manufacturing industries. However, the success of TQM implementation depends on various factors.

**Methodology:** The Analytical Hierarchy Process (AHP) is a structured technique for decision-making that involves breaking down complex problems into a hierarchy of criteria and alternatives, and then assessing their relative importance through pairwise comparisons. In this study, AHP is applied to identify and prioritize the factors influencing the success of TQM implementation in manufacturing industries.

**Factors Influencing TQM Success:**

1. Top management commitment
2. People Management:
3. Customer orientation
4. Continuous Improvement:
5. Education and training
6. Measurement and Feedback
7. Supplier Relationships
8. Process Management

**Conclusion:** The success of TQM implementation in manufacturing industries depends on various interrelated factors. Employing the Analytical Hierarchy Process (AHP) provides a systematic approach to identify and prioritize these factors. Top management commitment, Education and training and Customer orientation are among the key determinants of TQM success. By understanding and addressing these factors effectively, organizations can enhance their ability to implement TQM successfully and achieve sustainable competitive advantage.

# Product-Based Learning

Date: 23 March 2024



Dr. S. A. Thakur  
Assistant Professor in Chemical Engineering

Product-Based Learning (PBL) is an educational strategy in which students create a tangible object to demonstrate their learning and understanding of a specific topic or concept. Instead of typical assessments such as examinations or essays, students work on hands-on projects, applying their knowledge and skills to create a product. The product provides as proof of their learning, allowing them to demonstrate their comprehension in a practical and meaningful way. Product-Based Learning (PBL) directs students to systematic and standard work procedures to make or complete a product, through the actual work process. The product-based learning model contains steps that facilitate students to actively Learn, Participate, Interact, be Competent to produce the necessary products. Product Based Learning as the process of learning and the application of knowledge, students become clearer on the expectations for learning outcomes, which leads to higher quality products. It has advantages such as improving critical thinking and problem-solving skills, as well as encouraging creativity and innovation. However, it is critical to strike a balance between focusing on the product and the learning process, as well as ensuring fair and objective assessments.



# Introduction to Big Data and Its Platform

Date:23 March 2024



Dr. K. P. Adhiya  
Professor in Computer Engineering

Big Data is a massive collection of data that continues to increase dramatically over time. It is a data set that is so huge and complicated that no typical data management technologies can effectively store or process it. Big data is similar to regular data, except it is much larger. It can contain structured, semi-structured, and unstructured data, as well as data from many sources and sizes ranging from terabytes to zettabytes. Big data can be described by three characteristics - Volume, Variety and Velocity. The term "Volume" refers to a large amount of data. The term "Velocity" refers to the rapid collection of data. The term "Variety" refers to the data of various formats and types such as structured, semi-structured, and unstructured data. There are number of big data processing tools such as Apache Hadoop, Apache Spark, Apache Strom, IBM Stream Analytics, Google Cloud Dataflow etc. Apache Spark and Hadoop MapReduce are two popular big data processing frameworks used in the industry. The MapReduce is a parallel programming model for distributed applications for efficient processing of large amounts of data on large number of nodes in a reliable and fault-tolerant manner.

# Recovery of Value Added Products

Date: 23 March 2024



Dr. Vijay R. Diware  
Associate Professor in Chemical Engineering

In aminolysis, reaction of poly (ethylene terephthalate) waste (PETW) powder with hydrazine monohydrate (HMH) using lead acetate as a catalyst was carried out in a batch reactor at 339 K, reaction time from 30-240 min at the interval of 30 min and at atmospheric pressure. In glycolytic aminolysis, reaction of poly (ethylene terephthalate) waste (PETW) powder with ethylene glycol (EG) in presence of tetrahydrofuran (THF) using 0.003 mol zinc acetate as a catalyst was carried out in a batch reactor at 470 K, for 30-70 min at the interval of 10 min and at atmospheric pressure. Reactions were undertaken with various particle size ranges from 50-512.5 mm for both cases. Terephthalohydrazide (TPHD) and ethylene glycol (EG) were recovered during aminolysis of PETW. To increase the PETW conversion rate, external catalyst (lead acetate) was introduced during the reaction. Moreover, to improve the reaction rate cyclohexylamine (CHA) was introduced during reaction. Aminolysis of PETW was proportional to the reaction time. Depolymerization of PETW was inversely proportional to the particle size of PETW. Analyses of value added products (TPHD and EG) as well as PETW were undertaken. During glycolytic aminolysis, low molecular weight product of PETW was obtained during this step. In the next stage hydroxylamine hydrochloride (HAHC), cyclohexylamine (CHA) and potassium hydroxide solution was introduced to convert low molecular weight product of PETW into terephthalohydroxamic acid (TPHA) by introduction of HCl as per stoichiometric requirement. TPHA is used as insecticide, and it is highly expensive.

# Recent Trends in Data Analytics

Date: 23 March 2024



Dr. D. K. Kirange

Associate Professor in Computer Engineering

Recent trends in data analytics reflect a dynamic landscape propelled by technological advancements and evolving business needs. One notable trend is the increasing adoption of artificial intelligence (AI) and machine learning (ML) techniques to derive insights from vast datasets. Organizations are leveraging AI and ML algorithms to automate processes, detect patterns, and make data-driven decisions in real-time. Another significant trend is the rising popularity of cloud-based analytics platforms, offering scalability, flexibility, and cost-effectiveness. Cloud solutions enable businesses to store, manage, and analyse large volumes of data without strong infrastructure investments. Furthermore, there's a growing emphasis on privacy and data ethics, driven by stringent regulations like GDPR and CCPA. As data breaches become more prevalent, companies are prioritizing security measures and implementing robust data governance frameworks. Additionally, the integration of analytics with other emerging technologies such as the Internet of Things (IoT) and block chain is gaining traction, enabling advanced predictive analytics and enhanced data integrity. In addition, there's a shift towards augmented analytics, where AI-driven insights are seamlessly integrated into business workflows, empowering users with actionable intelligence. Overall, these trends underscore the evolving nature of data analytics, paving the way for innovative solutions and empowering organizations to unlock the full potential of their data assets.

# Twin Tube Tunnel between Thane and Borivali

Date: 23 March 2024



Dr. Pravin A. Shirule  
Associate Professor in Civil Engineering

The proposal of Construction of Twin Tube, 3 Lanes each Highway Tunnel between "Thane City and Borivali" in the State of Maharashtra by the MSRDC was approved in the 23rd September 2015. There is no direct connection between Thane and Borivali. The construction of twin tube tunnel is proposed between Thane and Borivali under Sanjay Gandhi National Park, so that the journey from Thane and Borivali will reduce by 12 Km. Highlights of the proposed 2 +2 lane tunnel are Total length - 11.80 km. (Tunnel: - 10.25 km, junction: - 1.55 km), Tunnel Diameter: 12.2 m (2 tunnels each of 2 lanes), At every 300m there will be cross connection lane. On May 04, 2023, the lowest offer of M/S MEGHA ENGINEERING & INFRASTRUCTURES LTD (MEIL) has been approved for Package-1: Ch. 0+00 to Ch No.5+750 Borivali - (lowest offer -₹ 7178 Crore) and Package-2: for Ch No.5+750 to Ch No 11 + 84 Thane (lowest offer ₹ 5879 Crore) (Including Provisional sum but excluding GST). Total 06 villages are affected, out of that 3 villages (Chitalsar, Manpada, Majiwada) joint measurement is proposed to be done by direct purchase method while remaining 3 villages i.e ( Boriwade, Chene and Yeur) are passing through Government Forest Area.

# Gummel-Poon BJT Model

Date: 30 March 2024



Dr. M. P. Deshmukh  
Professor in E & TC Engineering

The Gummel-Poon (GP) model, developed by H. C. Gummel and H. C. Poon in the 1960s, is a cornerstone of bipolar junction transistor (BJT) modeling and simulation. It provides a robust framework for understanding BJT behavior across various biasing conditions, crucial for accurate device characterization and circuit design. Widely used in circuit simulators like SPICE, the GP model accounts for significant effects, including the variation of transistor  $\beta_F$  and  $\beta_R$  values with direct current levels. The model begins with an overview of BJT structure and operation, emphasizing the importance of precise modeling in semiconductor device design. Key components include the charge-control model for base transport, current continuity equations, and charge conservation principles. These elements enable the GP model to capture essential device characteristics such as DC currents, small-signal behavior, and transient response, ensuring accurate BJT performance predictions in diverse circuit configurations. The GP model's versatility and scalability facilitate its integration into sophisticated simulation platforms and CAD tools widely used in the semiconductor industry. As a seminal contribution to semiconductor device modeling, the Gummel-Poon model remains a fundamental tool for engineers and researchers, advancing BJT technology and driving innovation in modern electronics.

# Thermoelectric Generator System Used as an Alternative Source of Energy

Date: 30 March 2024



Dr. P. M. Solanki

Assistant Professor in Mechanical Engineering

In recent years, an increasing concern of environmental issues of emissions, in particular global warming and the limitations of energy resources has resulted in extensive research into novel technologies of generating electrical power. Thermoelectric power generators have emerged as a promising alternative green technology due to their distinct advantages. Thermoelectric power generation offer a potential application in the direct conversion of waste-heat energy into electrical power where it is unnecessary to consider the cost of the thermal energy input. The application of this alternative green technology in converting waste-heat energy directly into electrical power can also improve the overall efficiencies of energy conversion systems. A significant amount of energy we consume each year is rejected as waste heat to the ambient. Conservative estimates place the quantity of energy wasted at about 70%. Converting the waste heat into electrical power would be convenient and effective for a number of primary and secondary applications. A viable solution for converting waste heat into electrical energy is to use thermoelectric power conversion. Thermoelectric power generation is based on solid state technology with no moving parts and works on principle of Seebeck effect.

# Semiconductor and Life

Date: 30 March 2024



Dr. Pankaj Zope  
Assistant Professor in Computer Engineering

Semiconductors are essential materials that conduct electricity under certain conditions, crucial for modern technology. Without them, global communication networks, electronics, healthcare equipment, and financial infrastructure would cease to function. India, despite having a skilled talent pool, currently imports most of its semiconductor needs but is aiming to establish itself as a semiconductor manufacturing hub through various initiatives and projects. Key challenges include limited expertise and regulatory complexities. The semiconductor industry is evolving rapidly, with advancements in AI hardware acceleration, sustainable practices, edge computing, open-source chip design, human-machine interfaces, and research areas like materials science, nanotechnology, and optoelectronics. These developments are shaping the future of technology and society.

# Microplastic

Date: 30 March 2024



Dr. Sonali B. Patil  
Assistant Professor in Civil Engineering

The future of concrete is in innovations. The future concrete technology will need high performance concrete with special features and yet with lower cost and environmental sustainability. Rubbercrete is innovative concrete material and will play significant role in the future concrete technology. This will require research by engineers and academicians. With the increase in population and tremendous industrialization the numbers of vehicles are increasing with a great pace. At the same time the waste rubber tyres generated by them is also increasing. This problem has been recognized in the second half of twentieth century when there were piling up of scrap tyre rubber on land fill sites creating environmental nuisance. Being non biodegradable they persist long in atmosphere. The natural aggregates (coarse as well as small) are getting scarce. Their over exploitation is creating havoc on ecosystem. Researcher are looking for alternative aggregates. Use of scrap tyre rubber is one such alternative. It can be used in small proportion in concrete without significant compromise in the strength. It can be used in larger proportion in non structural concrete. Thus the problem of disposal of scrap tyre rubber is solved at the same time the problem of scarcity of natural aggregates is also solved.



# Metallography

Date: 30 March 2024



Dr. D. B. Sadaphale

Assistant Professor in Mechanical Engineering

Metals are essential in every engineering field, especially in manufacturing, where materials are crucial for creating new inventions. In mechanical engineering, steel and cast iron are particularly important. Selecting the right material for manufacturing requires a critical analysis of properties, design considerations, and costs, driven by multiple constraints. Tools like Ashby plots help designers study and relate properties such as density and stiffness across various materials. Cast iron, with a rich history of property characterization over the past 200 years, has its final properties significantly influenced by its microstructure. This microstructure is affected by process variables including addition sequence, sherardizing treatment, inoculation treatment, hold time, solidification rate, and cooling rate. Due to these numerous variables and spatial variations, full computational modeling of cast iron remains elusive. Steel, an alloy of iron with up to 2% carbon, varies in properties depending on its microstructure, which includes austenite, ferrite, pearlite, cementite, and martensite. These constituents coexist in complex mixtures, with their properties influenced by temperature and carbon content. Adjusting the carbon content and applying heat treatment, mechanical working at different temperatures, or adding alloying elements can enhance hardness, strength, toughness, corrosion resistance, and electrical resistivity. Ultimately, the suitability of steel or cast iron depends on the specific component and its application. Material selection is tailored to meet these specific requirements, ensuring the best performance for the intended use.

# Chi Square Test in Research Methodology

Date: 30 March 2024



Dr. Sunita S. Patil  
Assistant Professor in FE

Statistical analysis is a key tool for making sense of data and drawing meaningful conclusions. The chi-square test is a statistical method commonly used in data analysis to determine if there is a significant association between two categorical variables. By comparing observed frequencies to expected frequencies, the chi-square test can determine if there is a significant relationship between the variables. This method is commonly used by researchers to determine the differences between different categorical variables in a population. A Chi-square test can also be used as a test for goodness of fit. It enables us to observe how well the theoretical distribution fits the observed distribution. It also works as a test of independence where it enables the researcher to determine if two attributes of a population are associated or not.

# Introduction to Block Chain

Date: 30 March 2024



Dr. A. D. Waghmare

Associate Professor in Computer Engineering

Blockchain technology is revolutionizing the modern economy by addressing key issues like trust, transparency, security, and data reliability in various industries. It operates as a peer-to-peer distributed ledger, where blocks are linked and secured using cryptographic hashes. Key characteristics include decentralization, security, immutability, and fault tolerance. Each block contains a hash of the previous block and requires proof-of-work to be added, ensuring integrity and preventing tampering. Blockchain exists in three versions: Blockchain 1.0 (Currency), Blockchain 2.0 (Smart Contracts), and Blockchain 3.0 (DApps), and can be implemented as public, private, or consortium blockchains. Despite advantages, it has drawbacks such as high costs, slower transactions, and vulnerability to errors. In healthcare, blockchain can streamline processes, protect patient privacy, and ensure data security. Traditionally, accessing health records involves cumbersome procedures prone to loss and misuse. Blockchain simplifies this by securely transferring information without intermediaries. Once data is recorded, it is nearly impossible to alter, enhancing security for transactions involving money, property, and contracts. This technology promises significant improvements in efficiency and trust across various business sectors.

# Emerging Technology Trends in Education

Date: 30 March 2024



Dr. Richa A. Modiyani  
Assistant Professor in Business Administration

The rapid evolution of technology is significantly transforming the educational landscape through various innovative tools and methodologies that enhance learning experiences and outcomes. Artificial Intelligence (AI) and machine learning are personalizing education by analyzing student performance and providing customized resources and support. Augmented Reality (AR) and Virtual Reality (VR) create immersive learning environments that increase engagement and comprehension by allowing interactive and experiential learning. Gamification integrates game design elements into educational activities, making learning more engaging and enjoyable. Blockchain technology ensures secure and transparent management of educational records and credentials. The Internet of Things (IoT) enhances educational environments by creating smart classrooms with optimized environmental conditions. Remote and hybrid learning models, accelerated by the COVID-19 pandemic, offer flexible and accessible education through video conferencing platforms and online collaboration tools. Learning analytics collect and analyze data on student behaviors to tailor instruction and improve outcomes. Educational content platforms like Khan Academy, Coursera, etc. democratize access to high-quality courses and resources. The inclusion of robotics and coding in curricula develops essential future skills, fostering critical thinking and creativity. The rollout of 5G technology enhances the delivery of digital content with faster and more reliable internet connections. These emerging technologies collectively make education more personalized, accessible, and engaging, preparing students for the demands of the future workforce.

# Block Chain and its Applications

Date: 30 March 2024



Dr. Sandip S. Patil  
Associate Professor in FE

A blockchain is a decentralized, distributed and public digital ledger that is used to record transactions across many computers so that the record cannot be altered retroactively without the alteration of all subsequent blocks and the consensus of the network. Blockchain allows crypto assets to be transferred quickly and securely. Blockchain-based protocols can be automated and decentralized, thus enabling the creation of crypto assets without the need for controlling, supervisory or centralized bodies. Less fraud, financing of terrorism and money laundering. In the last few years, Blockchain technology has generated massive interest among governments, enterprises, and academics, because of its capability of providing a transparent, secured, tamper-proof solution for interconnecting different stakeholders in a trustless setup. Recently, the Ministry of Electronics and Information Technology (MeiTY), Government of India, published the first draft of the "National Strategy on Blockchain" that highlights various potential applications that are of national interest. Against this backdrop, this presentation covers a comprehensive overview of blockchain technology, its origin, components, potential applications, national efforts, challenges and future trends.

# Future Energy Solutions

Date: 30 March 2024



Dr. Kiran Patil  
Assistant Professor in FE

Sustainable and renewable energy sources are the future, and project-based learning (PBL) supports this by encouraging innovative technologies. Conductive polymers like polyaniline (PANI) and polythiophene are crucial in this transition due to their electrical conductivity, flexibility, and lightness. PBL offers students hands-on experience with these materials and others. In solar power systems, flexible conducting polymers can serve as cost-effective alternatives for photovoltaic cells. A PBL project could involve designing, fabricating, and testing different doping techniques to optimize the efficiency and performance of polymer-based solar cells. Additionally, these materials are being explored for use in supercapacitors and batteries, with projects focusing on improving charge-discharge cycles, energy density, and lifespan. PBL encourages interdisciplinary collaboration, combining chemistry, materials science, and electrical engineering to develop practical solutions for energy needs. This approach not only makes learning engaging but also fosters creativity in solving real-world problems related to power generation, supply, distribution, and consumption. Integrating conducting polymers into current curricula will produce scientists and engineers with enhanced knowledge of sustainable energies. This will lead to cleaner, greener, and more efficient energy solutions, equipping future professionals to drive innovation in renewable energy.

# Tribological Aspects in Research

Date: 30 March 2024



Dr. P. G. Damle

Associate Professor in Mechanical Engineering

Biomaterials, whether natural or synthetic, are utilized to replace, regenerate, repair, or enhance bodily tissues or organs, aiming to improve or sustain quality of life. Wear resistance is a critical factor determining the lifespan of implants. Insufficient wear resistance can lead to the generation of debris, causing adverse reactions and inflammation when assimilated into the bloodstream. This debris accumulation at the bone-implant interface can result in implant loosening, necessitating revision surgery. In physiological environments, corrosion of implanted materials occurs due to corrosive ions and proteins, affecting the equilibrium of anodic and cathodic reactions. Historically, pure metals like Gold, Silver, and Copper were used for medical applications but faced limitations in surgical conditions. Alloys such as 316L stainless steel, Co-Cr, and Ti-6Al-4V have been developed for orthopedic applications, offering mechanical interlocking with bones without forming chemical bonds. These materials are now often coated with bioactive glasses to enhance biocompatibility and mechanical strength. Pin-on-disk wear tests evaluate biomaterials' wear resistance by pressing a cylindrical pin against a rotating disk under controlled loads and speeds, mimicking physiological conditions. Parameters like load, sliding distance, rotational speed, and temperature are monitored. After the test, worn surfaces are examined to analyze wear mechanisms and rates.

# AI for Research

Date: 6 April 2024



Dr. Surendra Ramteke  
Assistant Professor in Computer Engineering

Artificial Intelligence (AI) is revolutionizing research across diverse fields by accelerating data analysis, enhancing precision, enabling predictive modeling, automating tasks, and fostering interdisciplinary collaboration. AI processes vast datasets swiftly, identifying patterns and anomalies crucial for fields like genomics and disease research. Natural language processing and computer vision enhance accuracy in analyzing textual and visual data, benefiting areas such as literature review and medical imaging. Predictive modeling aids in forecasting trends in climate science and economics, while automation streamlines repetitive tasks in laboratories, reducing errors and saving time. Furthermore, AI facilitates interdisciplinary research by integrating data from various domains, leading to innovative discoveries. However, ethical considerations like data privacy and algorithmic bias require careful attention. Responsible AI usage with proper oversight and continuous researcher education is crucial. Embracing AI in research promises profound advancements, augmenting human capabilities and opening new avenues for exploration. The integration of AI heralds a future of efficient, accurate, and collaborative scientific inquiry, driving progress and innovation across disciplines.



# Recovery of Inorganic Acids from Industrial Wastewater

Date: 6 April 2024



Dr. Nikhil Y. Ghare  
Assistant Professor in Chemical Engineering

Generally, there are two types of industrial wastewater Inorganic wastewater (e.g. steel pickling wastewater) and Organic wastewater. Steel pickling is the process of removal of oxide scales formed on the surface of steel during hot rolling by dipping the surface of steel in inorganic acids such as hydrochloric acid or sulfuric acid or phosphoric acid. Spent acid due to various problems therefore warrant adequate treatment before discharge in receiving water bodies. Recovery and regeneration of acid from SPL is recommended to limit the use of chemicals and emission of harmful gases to the air. For recovery of acid Ion Exchange Method, Evaporation and Liquid Liquid Extraction methods are tried. After obtaining the preliminary quantitative and qualitative results, attempts have been made to work out the adsorption isotherms, distribution coefficients and kinetics etc., wherever suitable. Recovered acids were characterized by titrimetric and instrumental methods. For recovery of sulfuric acid, hydrochloric acid and phosphoric acid ion-exchange method is the best method. In case of liquid-liquid extraction for hydrochloric acid SPL, acid extraction efficiency was maximum for solvents such as Alamine 336, followed by TBP and Aliquat 336. For liquid-liquid extraction for sulfuric acid SPL, acid extraction efficiency was maximum for Alamine 336, followed by TBP and Aliquat 336. Studies for optimization of evaporation process and energy for the recovery of acids is required. Future perspectives consists of identification of better ion exchange resins for recovery of hydrochloric acid and phosphoric acid needs to be studied, identification of suitable solvent for liquid-liquid extraction of phosphoric acid is required to be studied.

# Bioinformatics Based Machine Learning

Date: 6 April 2024



Dr. Dinesh D. Puri  
Associate Professor in MCA

Effective data management is crucial in healthcare due to the widespread adoption of electronic medical records. Computer-assisted categorization of medical information into classifications such as illnesses can save time and effort. However, much of this data remains unstructured, posing challenges for text classification. Structured text is easier to compare, match, and classify, which is why converting unstructured text into a structured format is essential. In text classification, accuracy is a key challenge with unstructured text. Regular expressions, sequences of characters defining text patterns, can aid in classification when the text follows a fixed pattern. Finding patterns in unstructured text can be achieved using sequence alignment, a concept from biomedical research. This technique assigns similarity scores to potential alignments, helping to identify the best local alignments. The proposed method involves using local pairwise alignment to generate regular expressions automatically from aligned sequences, employing a bottom-up approach. These regular expressions serve as a dataset for various machine learning algorithms. The performance of the proposed machine learning classifier surpasses that of other classifiers, demonstrating the effectiveness of this approach in enhancing text classification in healthcare.

# Evolution of Wireless Technology

Date: 6 April 2024



Dr. Nafees M. Kazi

Assistant Professor in E & TC Engineering

The evolution of wireless technology has been a remarkable journey marked by significant advancements over the years. Beginning with the introduction of basic analog systems like 1G (first generation) in the 1980s, wireless technology rapidly progressed through digitalization in 2G, enabling features such as text messaging and data services. The transition to 3G brought faster data speeds, facilitating internet access and multimedia services on mobile devices. The advent of 4G LTE (Long-Term Evolution) in the late 2000s revolutionized wireless communication, offering unprecedented data rates, low latency, and enhanced multimedia capabilities. This era saw the widespread adoption of smartphones, streaming services, and IoT (Internet of Things) devices, transforming how people interact and businesses operate. The current focus is on 5G, the fifth generation of wireless technology, promising even faster speeds, ultra-low latency, and massive connectivity to support emerging technologies like autonomous vehicles, augmented reality, and remote surgeries. 5G's deployment involves utilizing higher frequency bands, massive MIMO (Multiple Input Multiple Output) antennas, and advanced network architectures to deliver unparalleled performance and enable futuristic applications. Looking ahead, the evolution of wireless technology is poised to continue, with developments in areas such as 6G, AI-driven networks, and satellite-based internet aiming to further enhance connectivity.

# Growth, Challenge and Opportunity in Renewable Sector

Date: 6 April 2024



Dr. Vijay Deshmukh  
Associate Professor in E &Tc Engineering

It's hard to imagine the way we live and work without energy. For most people, it's an essential part of everyday life we can often take for granted. But right now, our energy system continues to rely on the burning of fossil fuels, emitting huge amounts of greenhouse gases that are effect on our climate. By 2030, we want to have enabled a socially just and ecologically safe transition to a renewable energy system; we focused on only two renewable sectors which are solar power and green hydrogen energy Solar power and green hydrogen energy are both renewable energy sources that play a crucial role in reducing carbon emissions and addressing environmental concerns. However, they differ in terms of their primary applications, storage capabilities, and overall impact on the energy landscape. The important point to be highlight in these sectors are-Primary Source of Energy, Energy Storage, Applications, Environmental Impact, Efficiency and Infrastructure and Development Both energy sectors contribute to the transition towards a more sustainable and low-carbon energy system. They have different applications and strengths, and their integration can complement each other to create a more resilient and reliable renewable energy ecosystem.

# IOT & WEB of Things

Date: 6 April 2024



Dr. S. R. Suralkar  
Professor in Computer Engineering

The Internet of Things (IoT) and Web of Things (WoT) are transformative paradigms reshaping the landscape of technology and connectivity. IoT refers to the vast network of interconnected devices, sensors, and systems capable of exchanging data and enabling seamless automation across various domains. These interconnected devices, ranging from smart appliances to industrial machinery, facilitate data-driven decision-making. WoT extends the principles of IoT by integrating web technologies to enable interoperability and accessibility across heterogeneous IoT ecosystems. By leveraging standard web protocols and interfaces, WoT simplifies device integration, promotes device discovery, and facilitates interactions between IoT devices and web services. This integration with the World Wide Web empowers developers to create innovative applications and services that can seamlessly interact with IoT devices. Together, IoT and WoT drive the evolution towards a hyper-connected world where physical objects are endowed with digital intelligence, enabling unprecedented levels of automation, efficiency, and convenience. However, as these technologies proliferate, challenges such as interoperability, security, and privacy must be addressed to unlock their full potential while ensuring trust and reliability in the interconnected ecosystem. Consequently, continued research and innovation are essential to harnessing the transformative power of IoT and WoT for the benefit of society and industry alike.

# Future of IC Engine Technology

Date: 6 April 2024



Dr. K. Shrivatstava  
Associate Professor in Mechanical Engineering

While EV's boast zero tailpipe emissions, their production can generate significant carbon footprints. Hydrogen-powered fuel cell electric vehicles (FCEVs) offer zero emissions, but challenges remain. Transporting hydrogen is difficult, and fuel cells are currently expensive. Here's where advancements in ICE technology come in. Hybrid applications may face limitations, but developments like Gasoline Direct Injection (GDI) engines promise a 20% efficiency improvement. This technology can be adapted for hydrogen-fuelled internal combustion engines (HICE) which are under development. The Rise of HICE with Integrated Electrolyzer. One particularly exciting development is the concept of a Hydrogen Internal Combustion Engine (HICE) integrated with an electrolyzer. The hydrogen would then be used to power the HICE, eliminating tailpipe emissions. This approach offers advantages as it leverages the existing network of refueling stations. It also bypasses the challenges of transporting and storing hydrogen. A Two-Pronged Approach for India

**Two Wheelers:** EVs make perfect sense for daily commutes exceeding 30 kilometres, with a projected growth rate of 15-20%.

**Four-Wheelers:** The picture for four-wheeler EVs is less clear, with a projected growth of 6-7%. Here, GDI engines can bridge the gap until HICE technology matures and becomes affordable.

**FCEVs:** While not currently a viable option due to cost, advancements in hydrogen infrastructure may change this in the future.

## Conclusion

Cleaner fuels, new tech (GDI, HICE) and a focus on reducing emissions will keep the IC engine relevant. This two-pronged approach - EVs for two-wheelers, advanced ICE for four-wheelers - paves the way for India's sustainable transport future. Plus, HICE with built-in electrolyzer using renewable energy could be a game-changer.

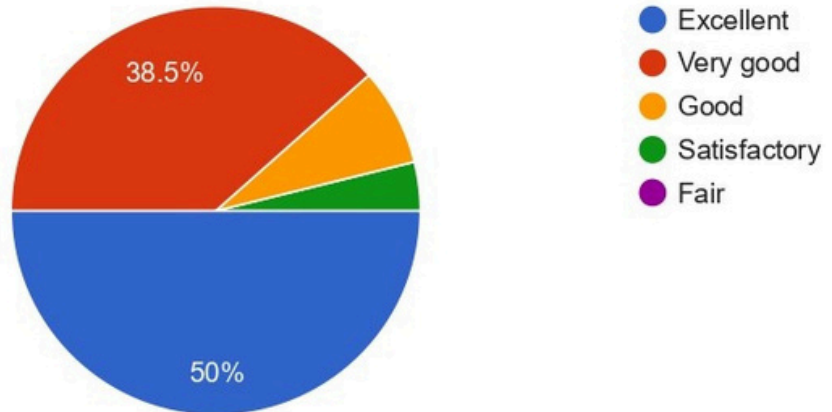
# Glimpses



# Feedback

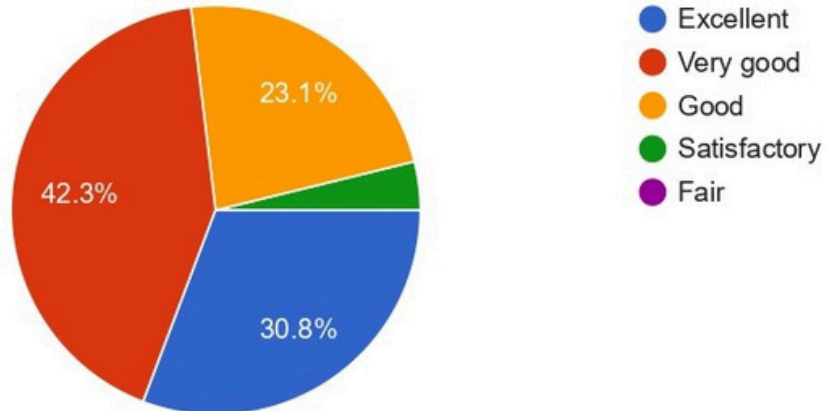
Rate overall organization of the Capacity Building Program.

26 responses



Rate the content discussed by the speakers ? \*

26 responses

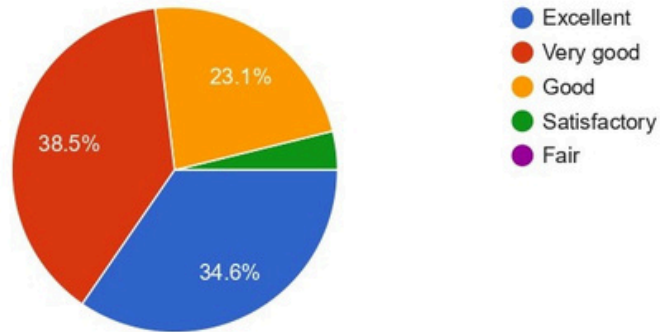




# Feedback

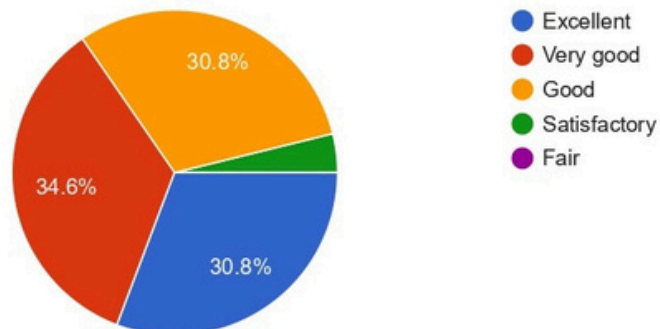
Rate the Capacity Building Program from your expectation point of view.

26 responses



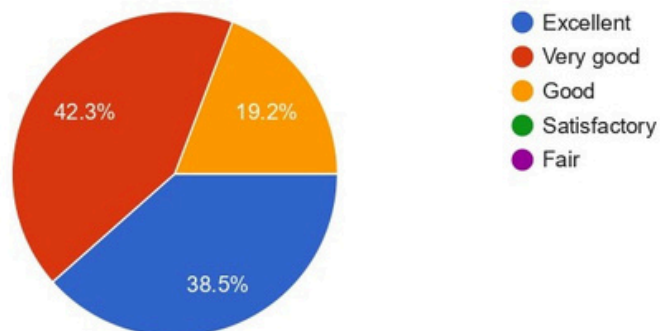
Rate the lecture sessions from the knowledge and information point of view.

26 responses



Rate the usefulness of the program for creativity, critical thinking, communication, and cooperation

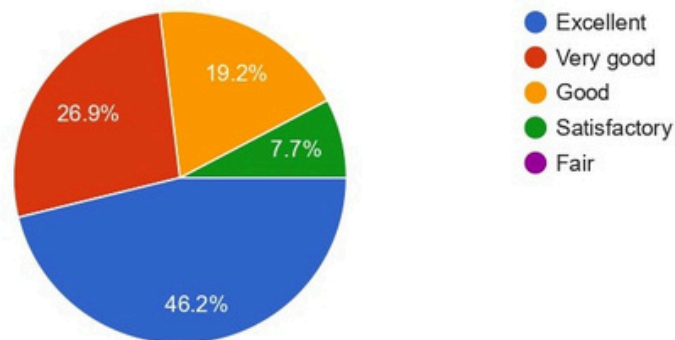
26 responses



# Feedback

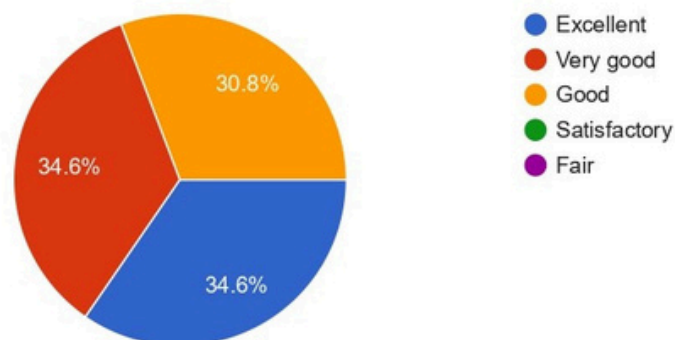
Rate the usefulness of the program to apply engineering knowledge in societal, environmental & sustainable issues.

26 responses



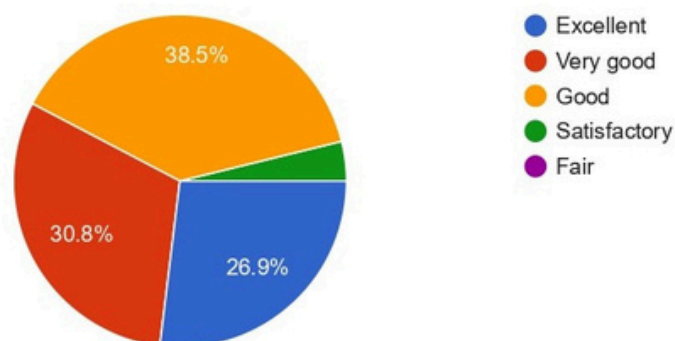
Rate the usefulness of the program for engaging in independent and life-long learning.

26 responses



Rate the usefulness of the program for enriching the curriculum with cutting – edge technologies.

26 responses

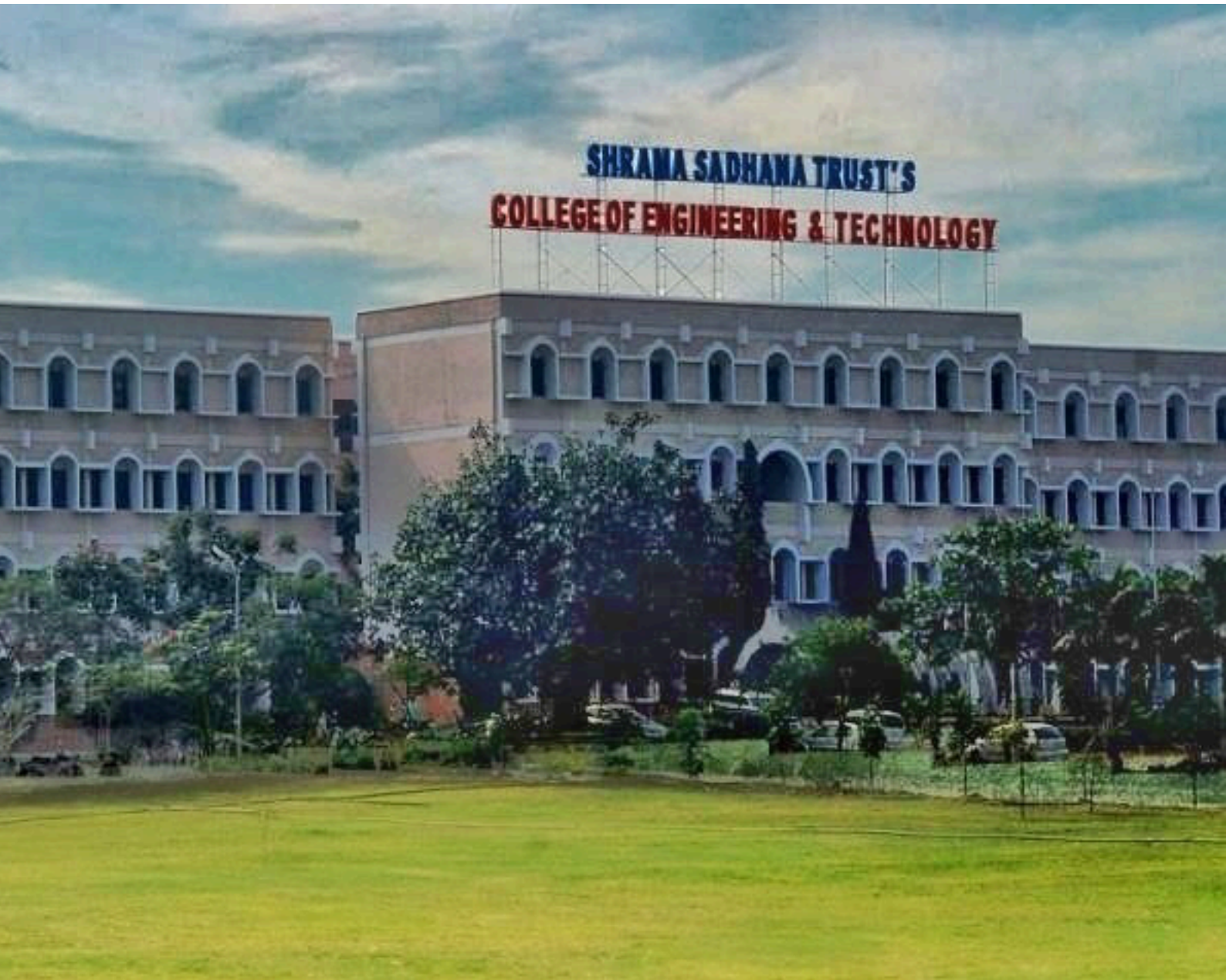


# Sample Certificates

 <p align="center"><b>SSBT's College of Engineering &amp; Technology, Bambhori, Jalgaon - 425001</b> Included under section 2(f) and 12(B) of the UGC Act, 1956 Grade A (3.14) NAAC Accredited</p>		
<h2 style="color: red;">Certificate of Participation</h2>		
<p align="center"><i>This is to certify that Mr. Ashish T. Bhole has attended Capacity Building Programme held between 23<sup>rd</sup> March to 13<sup>th</sup> April, 2024 organized by SSBT's College of Engineering &amp; Technology, Bambhori, Jalgaon (MS), India.</i></p>		
 Mr. M. M. Ansari Coordinator Electrical Engineering Dept	 Dr. S. P. Ramteke Coordinator Computer Engineering Dept	 Dr. G. K. Patnaik Principal

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<h2 style="color: red;">Certificate of Participation</h2>		
<p align="center"><i>This is to certify that Dr. Krishnakant P. Adhiya has attended Capacity Building Programme held between 23<sup>rd</sup> March to 13<sup>th</sup> April, 2024 organized by SSBT's College of Engineering &amp; Technology, Bambhori, Jalgaon (MS), India.</i></p>		
 Mr. M. M. Ansari Coordinator Electrical Engineering Dept	 Dr. S. P. Ramteke Coordinator Computer Engineering Dept	 Dr. G. K. Patnaik Principal

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[sscoetjal@gmail.com](mailto:sscoetjal@gmail.com)



[sscoetjalgaon.ac.in](http://sscoetjalgaon.ac.in)



+91 - 257 - 2258393